

SECTION 11500
FUEL STORAGE TANKS

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. The work under this Section includes furnishing and installing above ground fuel storage tanks, with concrete bases, gauges, valves and piping, as required and as shown on Drawings; and other related items necessary for a complete installation, as indicated on the Contract Drawings.

1.02 RELATED SECTIONS

- A. Section 02314 - Excavation, Backfill and Fill For Structures
- B. Section 03300 - Cast-in-place Concrete, Reinforcing and Formwork.
- C. Section 09900 – Painting
- D. Section 16420 - Stationary Engine-Generator Set
- E. Section 16425 - Portable Engine-Generator Set

1.03 REFERENCE, CODES AND STANDARDS

- A. FDEP - Florida Department of Environmental Protection, Ch. 62-761 & 62-762, FAC
- B. NFPA 30 and 30A - Flammable and Combustible Liquids Code.
- C. NFPA 31 - Installation of Oil-Burning Equipment.
- D. FBC - Florida Building Code.
- E. DERM - Department of Environmental Resources Management, Ch. 24-Miami Dade County Code
- F. U.L. Subject #2085.
- G. UFC - ICBO Uniform Fire Code, Section 79 Appendix A-II-F

1.04 QUALITY ASSURANCE

- A. Comply with the requirements of the Florida Building Code and appropriate codes and regulations, including DERM's requirements.
- B. Vaulted tank shall be designed, assembled, and installed in compliance with the Codes and Standards described in paragraph 1.03.

1.05 SUBMITTALS

- A. The fuel storage tank shall be furnished with an Affidavit of Compliance certifying that the fuel storage tank and accessories comply with the requirements herein is FDEP approved and installation plans have been reviewed and approved by DERM. Work will be accepted when such Certificates have been submitted and approved by the Department.
- B. Prepare and submit a site plan, drawn to scale, containing the following:
 - 1. Show property lines and indicate occupancy or use of adjacent property.
 - 2. Show streets, intersections and railroads.
 - 3. Show buildings on the site and indicate type of construction. Show building openings on walls adjacent to tanks.
 - 4. Show important utility lines, sewer, water, gas and electric including fire hydrants and catch basins.
 - 5. Show any nearby waterways, streams, rivers, lakes or body of water.
 - 6. Show any existing underground or above ground tanks.
 - 7. Show location of proposed tank and indicate shortest distance to buildings and property lines.
- C. Prepare and submit detail drawings of tank, to include the following:
 - 1. Tank type double walled above-ground storage tank (AST) or under-ground storage tank (UST), size, dimensions and spacing between adjacent tanks. Note: Miami Dade Water and Sewer Department requires vaulted Above Ground Tanks wherever possible.
 - 2. Base slab dimensions and bollard location and size.
 - 3. Vent size and location. Height of standard vent and type of cap.
 - 4. Fill details including spill and overfill protection.
 - 5. Piping details including shutoff valves and anti-siphon valves.
 - 6. Pumps and dispensing equipment, where applicable, including location, size and type.
 - 7. Electrical details, where applicable, including shutoff switch location and grounding wire.
 - 8. Level gauges and leak detection equipment. (i.e. Morrison Clock gauge for fuel level, Krueger or approved equal gauge for interstitial monitoring.)
 - 9. Signs and decals

1.06 WARRANTY

The assembly must carry a thirty year (30) warranty covering the primary tank and enclosure tank.

1.07 DELIVERY AND STORAGE

- A. Deliver, store, protect and handle products to site under provisions of Section 01600.
- B. Protect while transporting, storing, installing, and until work is completed.
- C. Do not handle or move tank unless it is empty.
- D. Do not drop or drag the tank.

- E. Do not handle or install tank without having knowledge and experience in procedures involved with proper and safe installation of tank used for storage of stable, flammable and combustible liquids.
- F. Equipment required for the shipping and off-loading of aboveground and below ground storage tanks include lifting straps, forklift and crane up to 150 ton capacity and nylon tie down straps. Carpet remnants shall be strategically placed on the bevels to prevent the tie down straps from scraping the coating loose while the tank is en route.

1.08 GENERAL FIRE PROTECTION

- A. A sign which prohibits smoking shall be conspicuously posted.
- B. Portable fire extinguisher shall be provided for the suppression of fires in accordance with NFPA 10 and UFC for high hazard area.
- C. Exterior warning signs and labels shall be at proper location and configuration to meet applicable code requirements.

PART 2 - PRODUCTS

2.01 ABOVEGROUND TANKS

A. General:

The Contractor shall furnish an FDEP approved insulated secondary contained aboveground storage tank (AST) system for flammable and combustible liquids. Storage tank system shall be a protected type UL listed for both vehicle impact protection and projectile resistant and shall be tested to and listed for the following:

- 1. UL - 142, aboveground steel tanks for flammable and combustible liquids.
 - 2. UL - 2085, two hour furnace fire test and two hour simulated pool fire test for insulated and protected tank.
 - 3. UL - 2085 and UFC Test Standard Appendix #A-II-F-1, for both Vehicle Impact Protection and Projectile Resistance.
 - 4. UL - 2085, insulated aboveground tanks for flammable and combustible liquids.
 - 5. UL - 2085, Non-metallic secondary Containment protected tanks for flammable and combustible liquids with secondary containment Emergency Venting by "Form of Construction"
 - 6. The requirement for uniform fire code for two hour (fire wall) test.
 - 7. NFPA 30 and 30A
- B. The primary steel tank shall be rectangular or cylindrical in shape and have continuous welds on all sides conforming with the American Welding Standard for continuous weld. The primary tank shall be minimum 0.125 inch thick carbon steel and manufactured in accordance with U.L. 142. However, thickness shall be based on a thirty year (30) warranty.
- C. The tank system shall be designed and tested to provide 2-hour fire protection for the primary tank. No steel members shall penetrate the walls or floor of the concrete

encasement to assure isolation from pool fire heat. The fire resistance of the tank shall be tested in accordance with the procedure established in U.L. 2085.

- D. The primary steel tanks shall have "emergency vent" system as per NFPA 30 Code requirements.
- E. The protected and insulated AST systems shall have a thru tank leak detector tube to allow for physical checkup and monitoring capability between the primary and the secondary containment. A mechanical interstitial monitoring gauge (i.e. Kreuger or approved equal shall be installed.)
- F. The primary steel tank shall be pressure tested at 5 psig for 24 hours.
- G. The outer surface of the primary steel tank shall be covered by a minimum of 1/4" Thick (6.4 mm) Styrofoam insulation panels or equally acceptable thermal insulation. No steel or insulating spacer panels in the unit shall come in direct contact with concrete or any other corrosive material. All exposed steel shall be powder-coated to inhibit corrosion.
- H. The secondary containment shall consist of a 30 mil thick High Density Polyethylene membrane enclosing the steel tank and insulation material.
- I. The primary steel tank and the secondary containment shall be encased in six inches of monolithic reinforced concrete, with a minimum design strength of 4,000 and 5,000 psi at 28 days depending on the tank size. The concrete design shall include the following for long term durability: air entrainment, water reducing admixture, and steel reinforcement. Reinforcement bars shall be 1/2-inch diameter conforming to ASTM A615, grade 40 minimum.
- J. The protected and insulated AST systems shall be of concrete exterior and a continuous and visually verifiable monolithic (seamless) pour on top, bottom, ends, and sides and contain no cold joints or heat sinks (heat transfer points). The AST must be shop fabricated and tested in accordance with the UL listings. It shall also be pressurized at 5 psig during concrete encasement.
- K. No steel or insulating spacer panels in the unit shall come in direct contact with concrete or any other corrosive material.
- L. All openings shall be from the top only.
- M. All exposed metal must be powder coated to inhibit corrosion.
- N. The protected and insulated AST systems shall have a coated concrete exterior to resist weather and reflect sunlight. Exterior surface shall be coated with an epoxy based semi-gloss protective finish.
- O. The protected and insulated AST systems shall have a warranty of 30 years for all systems regardless of capacity.

- P. Support legs shall provide a minimum of 4-inch clearance and shall be monolithically cast with the concrete vault. Each support leg shall include two (2) cast-in hurricane and flood anchor points.
- Q. The protected and insulated AST systems design shall have been in use for a minimum of five (5) years. The manufacturer must stipulate no AST containment system failure in 16,000 units produced.
- R. The protected and insulated AST systems shall have two (2) lugs for connecting grounding conductors for lightning protection in accordance with NFPA 78.
- S. Tank system shall be ConVault Aboveground Tank, manufactured by ConVault, Inc., Wildwood, FL, or approved equal.

2.02 TANK CAPACITY

The tank capacity shall be as shown on Drawings. Minimum tank size shall be based on the fuel capacity required to run one pump continuously for five days, at maximum horsepower.

2.03 VENTING

- A. Atmospheric Vent: The tank system shall be furnished with a 2-inch vent and an appropriate emergency vent. A pressure/vacuum vent (PVV) cap shall be installed on the 2-inch vent line. Venting systems shall meet all 2-inch standard vent and emergency vent requirements of U.L. 142. Height of the vent line shall be per code. Vent line shall be capable of sufficient venting into the atmosphere in case of pressure build-up inside the tank. Vent cap shall be installed with no overhead obstructions to allow free flow of vapors from the vent.
- B. Primary Tank Emergency Vent: The tank system shall be furnished with pressure relief nipples and emergency pressure relief devices to automatically relieve the pressure of the primary tank before it reaches 2.5 psig. It shall include a fire screen to prevent ignition from an external source.
- C. Secondary Containment Venting Device: The tank system's secondary containment shall be furnished with an emergency venting device. The venting device shall consist of a pressure relief nipple and a relief device. The emergency device will open before the secondary containment internal pressure reaches 2.5 psig.

2.04 OVER SPILL CONTAINMENT

- A. The protected and insulated AST systems shall include an FDEP approved 7 gallon powder coated, U.L. listed over spill containment, and shall include normally closed valve to release spilled product into the primary steel tank.
- B. Over spill containment system shall be mounted on top of the tank and shall surround the tank fill-pipe. The containment will catch occasional spills. A hand-activated spring-loaded valve shall be provided inside the containment to drain the spill back into the tank.

- C. Lid to over spill containment shall meet proper color-coding requirements.

2.05 FILL PIPE

The tank system shall be furnished with a MNPT fitting for filling. The fill pipe shall be equipped with an adapter and lockable cap. Fill pipe diameter shall be 4-inches.

2.06 COLLISION PROTECTION

Collision protection approved by the tank manufacturer shall be located around tank perimeter for vehicular protection. Pipe bollards shall be installed for collision protection, as follows: concrete filled steel posts, 4-inches diameter (minimum) by 6 feet long, shall be set 3 feet into the ground within a 15-inch diameter concrete filled hole. Post shall be spaced 4 feet center to center and shall be spaced from tank in accordance local codes.

2.07 CONCRETE PAD

The tank system shall be installed on a reinforced concrete pad to protect against stresses from uneven settlement and to assure that the tank supports allow for inspection beneath the tank. Concrete foundation (Pad) shall have a minimum compressive strength in 28 days equal to 3000 psi. Pad lengths, widths, thickness, and placement specifications shall be as recommended by the manufacturer.

2.08 PIPING AND ACCESSORIES

- A. All accessories (vents, product fill, etc.) shall be installed to meet the site specific requirements and governing codes. Drilled penetrations of the concrete are not to exceed a depth of 2-inches.
- B. Adherence to all operational safety precautions shall be taken under consideration, and piping shall include safety valves as follows:
 - 1. Angle check valve with pressure relief or foot valve and strainer. Foot valve and strainer shall be located 1-inch from the inside bottom of the tank.
 - 2. Shutoff valve with fusible link on supply piping.
 - 3. Furnish an anti-syphon valve, if suction line falls below the high fuel level.
- C. Exterior warning signs and labels shall be of proper location and configuration to meet applicable code requirements. Tanks shall be marked on all sides with warning signs: "FLAMMABLE" or "COMBUSTIBLE", "NO SMOKING", product identification and other signs as required by applicable codes.
- D. Exposed piping exterior surface shall be coated with an epoxy based semi-gloss protective finish in a WASD approved safety blue color for diesel product.

2.09 ELECTRICAL

- A. Electrical service and fuel piping to the pumps unit shall be installed in accordance with the requirements of NEC and NFPA and local code requirements.
- B. All electrical devices used with or located twenty (20) feet of the tank shall conform to NFPA 70 Hazardous Locations. All electrical conduits and wiring connected to the tank shall be explosion proof and in strict accordance with NEC Class 1, Division 1.
- C. Electrical grounding shall be installed on tank. Tank shall be provided with a grounding lug on the 2-inch vent nipple.

2.10 MISCELLANEOUS ACCESSORIES

A. Angle Check Valve for Suction Line:	2-inch OPW 32-H by Dover Corp.
B. Bushings:	OPW 53, by Dover Corp.
C. Fill Cap:	4-inch, lock-type, OPW 634-TT with 4x4-inch adaptor, OPW 663-T, by Dover Corp.
D. Fill Cap Manhole:	12-inch, cast iron, with rubber gasket, OPW 104-A by Dover Corp.
E. Foot Valve:	1-inch, double poppet, bronze OPW92 by Dover Corp.
F. Pipe Straps for Vent Pipe:	Galvanized 2-inch No.3039T19 by McMaster-Carr.
G. Stainless Steel Cable:	AISI Type 316 wire rope.
H. Steel Pipe – Black:	See Section 15060, Piping and Fittings. Thoroughly clean interior of pipe before use with fuel.
I. Turnbuckles:	Grinnell Fig. 230, hot-dip galvanized.
J. Vent Cap:	2-inch, OPW-63, by Dover Corp.

2.11 STAIRS AND CATWALKS

- A. Install stairs/catwalks to facilitate access, inspections and maintenance services to the tanks as required.
- B. Stairs shall comply with OSHA Standard 1910.24.
- C. Railings shall be provided as required by OSHA Standard 1910.23

- D. Stairs shall be 36" wide, straight-tread with top platform.
 - a. Top platform shall be 30" in direction of travel by 36" wide.
 - b. Top platform shall be 24"-30" below top of tank (excluding appurtenances).
- E. Stair assembly shall be galvanized carbon-steel, free-standing with a 1"-3" clear gap between stairs and tank. (It shall not be in contact with tank or be supported by tank.)

PART 3 - EXECUTION

3.01 TANK SITE

- A. The tank location and foundation shall comply with the all applicable local codes and ordinances.
- B. Tanks shall be located a minimum of 1/3 the height of the vault (40 feet maximum) away from down slopes greater than 3:1, and ½ the height of the vault (15 feet maximum) away from up slopes greater than 3:1.
- C. Tanks shall not be located over underground utilities or directly beneath overhead power and telephone lines.
- D. The tank shall be protected from vandalism and accidental damage in accordance with all applicable codes.
- E. Fire department vehicle access should be provided within 150 feet of the tank.
- F. The venting of the tank to a remote location must include the use of a steel pipe equal to or greater in size than the vent outlet. The methods of supporting such piping against displacement must comply with local codes.

3.02 FOUNDATION REQUIREMENT

- A. The foundation for the tank shall be designed to support the tank plus 100% of the weight of the maximum amount of the product the tank will be storing. The foundation design shall also include provision for draining surface water away from the tank to minimize the risk of fuel accumulation from the overfill or spills at the tank footings.
- B. The tank foundation (concrete pad) shall sit on compacted fill, free of organic material. The following minimum characteristics shall be used if the tank is installed on a continuous solid slab which will uniformly distribute the weight of the tank and its contents to the soil:
 - 1. Bearing Capacity: 1000 lb. per sq. ft., minimum.
 - 2. Modulus of subgrade reaction: 7 pci, minimum.
 - 3. Expansion index: 35, maximum

4. Total settlement: 1-inch, maximum.
5. Differential settlement: ½-inch, maximum.
6. Provide a minimum six inch (6") thick granular subgrade, compacted and graded to a level uniform subsurface prior to the cast slab placement or pouring of the cast-in-place slab.
7. Soil surface under foundation shall be flat within 1/16" per foot. Soil around foundation should be sloped away 1/8" per foot minimum for 5 feet.

3.03 INSTALLATION OF ABOVE GROUND FUEL TANKS

- A. General: The above ground vaulted tanks shall be set on a concrete foundation (pad) in accordance with current installation instructions and foundation engineering drawings, and shall comply with all governing code requirements.
 1. Concrete Foundation (Pad): Reference and follow the appropriate manufacturer's drawings for the respective foundation size and load bearing requirements for pad lengths, widths, thickness, and placement specifications.
 2. Unloading and Handling: A thorough inspection of the entire assembly shall be conducted prior off loading. Check for any damage, chipping or other impairments incurred during transportation. Do not remove the shrink wrapped plastic cover until after final installation of vents and piping. However, shrink wrap should be left on if installation is not to concur with delivery, as vault finish will be affected if shrinkwrapped and left exposed to sunlight for several days.
 3. Equipment used to off-load: The equipment shall be adequate size and capability to lift the vault without dragging and dropping to ensure that no damage is done to the vault or its coating. The vault shall be lifted lowered, and secured only by use of nylon straps (chain and cables are not allowed) placed at designated lifting areas to avoid damage to the assembly.
 4. The vault shall be anchored in accordance with applicable code requirements.
 5. Air Pressure Test of Internal Steel Tank: Contractor shall verify the internal steel tank tightness during the process of placing the unit into service. Use the basic procedure and desired result as an unvaulted steel tank, and in accordance the industry standard procedures as published by the Steel Tank Institute or other professional organizations and manufacturer recommended procedures. Pressure test the tank at 5 psig. No leakage shall be permitted. Vaults under pressure shall not be left unattended.

END OF SECTION